

# **BABU BANARSI DAS UNIVERSITY**



**NO SQL and Dbas 101**  
**( BCADSN13202 )**

## **Project**

**Submitted To:**

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**Class:BCADS25**

## Project

**Q1.** List the names and departments of students who have more than 85% attendance and are skilled in both "MongoDB" and "Python"

### **Query:**

```
db.students.find({attendance:{$gt:85},skills:{$all:
["MongoDB","Python"]}}, {name:1,department:1,_id:
0})
```

### **Query with Output:**

```
raghvendra> db.students.find({attendance:{$gt:85},skills:{$all:["MongoDB","Python"]}}, {name:1,department:1,_id:0})//raghvendra 124025
8347
raghvendra>
```

**Q2.** Show all faculty who are teaching more than 2 courses. Display their names and the total number of courses they teach.

### **Query:**

```
db.faculty.aggregate([
{
  $project: {
    _id: 0,
    name: 1,
    total_courses: { $size: "$courses" }
```

```
    }  
  },  
  {  
    $match: {  
      total_courses: { $gt: 2 }  
    }  
  }  
])
```

**Query with Output:**

```

raghvendra> db.faculty.aggregate([
...   {
...     $project: {
...       _id: 0,
...       name: 1,
...       total_courses: { $size: "$courses" }
...     }
...   },
...   {
...     $match: {
...       total_courses: { $gt: 2 }
...     }
...   }
... ])
... // raghvendra 1240258347
[
  { name: 'Charles Newton', total_courses: 3 },
  { name: 'Julia Cole', total_courses: 3 },
  { name: 'Darrell Velasquez', total_courses: 3 },
  { name: 'Michael Poole', total_courses: 3 },
  { name: 'John Duran', total_courses: 3 },
  { name: 'Daniel Allen', total_courses: 3 },
  { name: 'Matthew Hanna', total_courses: 3 },
  { name: 'Michael Johnson', total_courses: 3 },
  { name: 'Robert Lara', total_courses: 3 }
]
raghvendra>

```

**Q3.** Write a query to show each student's name along with the course titles they are enrolled in (use \$lookup between enrollments, students, and courses).

### Query:

```

db.enrollments.aggregate([ { $lookup: { from:
"students",          localField:      "student_id",
foreignField: "_id", as: "student" } }, { $unwind:
"$student" }, { $lookup: { from: "courses",
localField: "course_id", foreignField: "_id", as:

```

```
"course" } } }, { $unwind: "$course" }, { $project:
{ _id: 0, student_name: "$student.name",
course_title: "$course.title" } } ] )
```

## Query with Output:

```
raghvendra> db.enrollments.aggregate([ { $lookup: { from: "students", localField: "student_id", foreignField: "_id", as: "student" }
}, { $unwind: "$student" }, { $lookup: { from: "courses", localField: "course_id", foreignField: "_id", as: "course" } }, { $unwind:
"$course" }, { $project: { _id: 0, student_name: "$student.name", course_title: "$course.title" } } ] ) //raghvendra 1240258347
[
  {
    student_name: 'Alexandra Bailey',
    course_title: 'Reactive neutral adapter'
  },
  {
    student_name: 'Megan Taylor',
    course_title: 'Sharable bifurcated paradigm'
  },
  {
    student_name: 'Alejandro Hart',
    course_title: 'Focused user-facing paradigm'
  },
  {
    student_name: 'Timothy Sparks',
    course_title: 'Focused user-facing paradigm'
  },
  {
    student_name: 'Juan Morris',
    course_title: 'Balanced asynchronous framework'
  },
  {
    student_name: 'Donna Morgan',
    course_title: 'Organic optimal product'
  },
  {
    student_name: 'Patricia Scott',
    course_title: 'Fully-configurable responsive solution'
  },
  {
    student_name: 'Carolyn Chandler',
    course_title: 'Horizontal attitude-oriented knowledgebase'
  }
]
```

**Q4.** For each course, display the course title, number of students enrolled, and average marks (use \$group).

## Query:

```
db.courses.aggregate([ { $lookup: { from:
"enrollments", localField: "_id", foreignField:
"course_id", as: "enrolled_students" } }, {
$project: { _id:0,title: 1, number_of_students: {
$size: "$enrolled_students" }, average_marks:
{ $avg: "$enrolled_students.marks" } } } ] );
```

## Query with Output:

```

raghvendra> db.courses.aggregate([ { $lookup: { from: "enrollments", localField: "_id", foreignField: "course_id", as: "enrolled_students" } }, { $project: { _id:0,title
: 1, number_of_students: { $size: "$enrolled_students" }, average_marks: { $avg: "$enrolled_students.marks" } } } ] );// raghvendra 1240258347
[
  {
    title: 'Profit-focused high-level capability',
    number_of_students: 2,
    average_marks: 58.5
  },
  {
    title: 'Multi-lateral systemic success',
    number_of_students: 1,
    average_marks: 65
  },
  {
    title: 'Reduced 5thgeneration complexity',
    number_of_students: 0,
    average_marks: null
  },
  {
    title: 'Enhanced real-time website',
    number_of_students: 0,
    average_marks: null
  },
  {
    title: 'Streamlined scalable policy',
    number_of_students: 2,
    average_marks: 71.5
  },
  {
    title: 'Integrated fault-tolerant task-force',
    number_of_students: 2,
    average_marks: 68.5
  },
  {
    title: 'Organic asynchronous matrix',
    number_of_students: 1,
    average_marks: 68
  },
  {
    title: 'Progressive exuding ability',
    number_of_students: 3,
    average_marks: 84
  },
  {
    title: 'Universal analyzing utilization',
    number_of_students: 1,
    average_marks: 62
  },
  {
    title: 'Decentralized multi-tasking architecture',

```

**Q5.** Find the top 3 students with the highest average marks across all enrolled courses.

## Query:

```

db.enrollments.aggregate([ { $lookup: { from:
"students", localField: "student_id",
foreignField: "_id", as: "studentInfo" } }, {
$unwind: "$studentInfo" }, { $group: { _id:
"$student_id", name: { $first:
"$studentInfo.name" }, department: { $first:
"$studentInfo.department" }, avgMarks: { $avg:
"$marks" } } }, { $sort: { avgMarks: -1 } }, {
$limit: 3 } ] )

```

## Query with Output:

```

raghvendra> db.enrollments.aggregate([ { $lookup: { from: "students", localField: "student_id", foreignField: "_id", as: "studentInfo" } }, { $unwind: "$studentInfo" }, {
  $group: { _id: "$student_id", name: { $first: "$studentInfo.name" }, department: { $first: "$studentInfo.department" }, avgMarks: { $avg: "$marks" } } }, { $sort: { avgM
avgMarks: -1 } }, { $limit: 3 } ] ) // raghvendra 1248258347
[
  {
    _id: '5088',
    name: 'Glenn Phillips',
    department: 'Civil',
    avgMarks: 100
  },
  {
    _id: '5046',
    name: 'Brandon Ries',
    department: 'Biotechnology',
    avgMarks: 98
  },
  {
    _id: '5068',
    name: 'Larry Ramsey',
    department: 'Biotechnology',
    avgMarks: 94
  }
]
raghvendra>

```

**Q6.** Count how many students are in each department. Display the department with the highest number of students.

**Query:**

```

db.students.aggregate([ { $group: { _id:
"$department", totalStudents: { $sum: 1 } } }, {
  $sort: { totalStudents: -1 } }, { $limit: 1 } ] )

```

**Query with Output:**

```

raghvendra> db.students.aggregate([ { $group: { _id: "$department", totalStudents: { $sum: 1 } } }, { $sort: { totalStudents: -1 } }, { $limit: 1 } ] ) // raghvendra 12482
58347
[ { _id: 'Electrical', totalStudents: 23 } ]
raghvendra>

```

**Q7.** Update attendance to 100% for all students who won any "Hackathon".

**Query:**

```

db.students.updateMany( { awards: {
  $elemMatch: { name: "Hackathon", winner:
true } } }, { $set: { attendance: 100 } } );

```

**Query with Output:**

```

raghvendra> db.students.updateMany( { awards: { $elemMatch: { name: "Hackathon", winner: true } } }, { $set: { attendance: 100 } } ); // raghvendra 1248258347
{
  acknowledged: true,
  insertedId: null,
  matchedCount: 0,
  modifiedCount: 0,
  upsertedCount: 0
}
raghvendra>

```

**Q8.** Delete all student activity records where the activity year is before 2022.

### Query:

```
db.activities.deleteMany({ activityYear: { $lt: 2022 } })
```

### Query with Output:

```
raghvendra> db.activities.deleteMany({ activityYear: { $lt: 2022 } }) // raghvendra 1240258347
{ acknowledged: true, deletedCount: 0 }
raghvendra>
```

**Q9.** Upsert a course record for "Data Structures" with ID "C150" and credits 4—if it doesn't exist, insert it; otherwise update its title to "Advanced Data Structures".

### Query:

```
db.courses.updateOne( { _id:"C150" }, { $set: {
  title: "Advanced Data structures", credits: 4 } },
{ upsert: true } );
```

### Query with Output:

```
raghvendra> db.courses.updateOne( { _id:"C150" }, { $set: { title: "Advanced Data structures", credits: 4 } }, { upsert: true } ); // raghvendra 1240258347
{
  acknowledged: true,
  insertedId: 'C150',
  matchedCount: 0,
  modifiedCount: 0,
  upsertedCount: 1
}
raghvendra>
```

**Q10.** Find all students who have "Python" as a skill but not "C++".

### Query:



```
db.students.find({ skills: { $in: ["Python"], $nin: ["C++"] } })
```

## Query with Output:

```
raghvendra> db.students.find({ skills: { $in: ["Python"], $nin: ["C++"] } })// raghvendra 1240258347
[
  {
    _id: 'S004',
    name: 'Kyle Hale',
    dob: '2000-10-20',
    department: 'Electrical',
    skills: [ 'Python', 'Java' ],
    attendance: 79.78
  },
  {
    _id: 'S008',
    name: 'Cody Whitehead',
    dob: '2003-11-25',
    department: 'Biotechnology',
    skills: [ 'JavaScript', 'Python' ],
    attendance: 92.03
  },
  {
    _id: 'S009',
    name: 'Thomas Jackson',
    dob: '2002-10-25',
    department: 'Electrical',
    skills: [ 'Python', 'AutoCAD' ],
    attendance: 96.64
  },
  {
    _id: 'S012',
    name: 'Steven Wong',
    dob: '2003-09-06',
    department: 'Biotechnology',
    skills: [ 'MongoDB', 'Python' ],
    attendance: 77.17
  },
  {
    _id: 'S015',
    name: 'Cheryl Jackson',
    dob: '2006-04-20',
    department: 'Civil',
    skills: [ 'Research', 'Python' ],
    attendance: 60.98
  },
  {
    _id: 'S023',
    name: 'Mr. Darius Newman',
    dob: '2000-12-13',
    department: 'Mechanical',
    skills: [ 'Python', 'SQL' ],
    attendance: 95.06
  },
]
```

**Q11.** Return names of students who participated in "Seminar" and "Hackathon" both.

## Query:

```
db.students.find( { participation: { $all: ["Seminar", "Hackathon"] } }, { name: 1, _id: 0 } );
```

## Query with Output:

```
raghvendra> db.students.find( { participation: { $all: ["Seminar", "Hackathon"] } }, { name: 1, _id: 0 } );// raghvendra 1240258347
raghvendra> |
```

**Q12.** Find students who scored more than 80 in "Web Development" only if they belong to the "Computer Science" department.

### Query:

```
db.enrollments.aggregate([ { $match: { marks: { $gt: 80 } } }, { $lookup: { from: "students", localField: "student_id", foreignField: "_id", as: "student_info" } }, { $unwind: "$student_info" }, { $match: { "student_info.department": "Computer Science" } }, { $project: { _id: 0, name: "$student_info.name", department: "$student_info.department", marks: 1 } } ] );
```

### Query with Output:

```
raghvendra> db.enrollments.aggregate([ { $match: { marks: { $gt: 80 } } }, { $lookup: { from: "students", localField: "student_id", foreignField: "_id", as: "student_info" } }, { $unwind: "$student_info" }, { $match: { "student_info.department": "Computer Science" } }, { $project: { _id: 0, name: "$student_info.name", department: "$student_info.department", marks: 1 } } ] ); // raghvendra 1240258347
[
  {
    marks: 100,
    name: 'Nicholas Turner',
    department: 'Computer Science'
  },
  { marks: 82, name: 'Mary Bennett', department: 'Computer Science' },
  { marks: 82, name: 'Bruce Blair', department: 'Computer Science' },
  {
    marks: 91,
    name: 'Michelle Walters',
    department: 'Computer Science'
  },
  { marks: 91, name: 'David Rivera', department: 'Computer Science' },
  { marks: 81, name: 'Donna Spencer', department: 'Computer Science' }
]
raghvendra> |
```

**Q13.** For each faculty member, list the names of all students enrolled in their courses along with average marks per student per faculty.

## Query:

```
db.faculty.aggregate([ { $unwind: "$courses" },
{ $lookup: { from: "courses", localField:
"courses", foreignField: "_id", as: "course_info"
} }, { $unwind: "$course_info" }, { $lookup: {
from: "enrollments", localField:
"course_info._id", foreignField: "course_id", as:
"enrollment_info" } }, { $unwind:
"$enrollment_info" }, { $lookup: { from:
"students", localField:
"enrollment_info.student_id", foreignField:
"_id", as: "student_info" } }, { $unwind:
"$student_info" }, { $group: { _id: {
faculty_name: "$name", student_name:
"$student_info.name" }, average_marks: {
$avg: "$enrollment_info.marks" } } }, { $group:
{ _id: "$_id.faculty_name", students: { $push: {
name: "$_id.student_name", average_marks:
"$average_marks" } } } }, { $replaceRoot: {
newRoot: { faculty_name: "$_id", students:
"$students" } } } ] );
```

## Query with Output:

```

raghvendra> db.faculty.aggregate([ { $unwind: "$courses" }, { $lookup: { from: "courses", localField: "courses", foreignField: "_id",
as: "course_info" } }, { $unwind: "$course_info" }, { $lookup: { from: "enrollments", localField: "course_info._id", foreignField: "
course_id", as: "enrollment_info" } }, { $unwind:
... "$enrollment_info" }, { $lookup: { from: "students", localField: "enrollment_info.student_id", foreignField: "_id", as: "student_
info" } }, { $unwind: "$student_info" }, { $group: { _id: { faculty_name: "$name", student_name: "$student_info.name", average_mark
s: { $avg: "$enrollment_info.marks" } } }, { $group: { _id: "$_id.faculty_name", students: { $push: { name: "$_id.student_name", aver
age_marks: "$average_marks" } } } }, { $replaceRoot: { newRoot: { faculty_name: "$_id", students: "$students" } } } ] );
... // raghvendra 1240258347
[
  {
    faculty_name: 'Thomas Lewis',
    students: [
      { name: 'Nicholas Turner', average_marks: 100 },
      { name: 'Juan Morris', average_marks: 80 }
    ]
  },
  {
    faculty_name: 'Autumn White',
    students: [ { name: 'Nicholas Turner', average_marks: 51 } ]
  },
  {
    faculty_name: 'Michael Poole',
    students: [
      { name: 'Cheryl Jackson', average_marks: 82 },
      { name: 'Marie Wilson', average_marks: 91 },
      { name: 'Alexandra Bailey', average_marks: 72 }
    ]
  },
  {
    faculty_name: 'Alexis Stone',
    students: [
      { name: 'Barbara Jones', average_marks: 93 },
      { name: 'Anthony Zavala', average_marks: 90 }
    ]
  },
  {
    faculty_name: 'Jessica Black',

```

**Q14.** Show the most popular activity type (e.g., Hackathon, Seminar, etc.) by number of student participants.

**Query:**

```

db.activities.aggregate([ { $addFields: {
  participants_array: { $cond: { if: { $isArray:
"$participants" }, then: "$participants", else: {
$cond: { if: { $isArray: "$student_ids" }, then:
"$student_ids", else: { $cond: { if: { $isArray:
"$students" }, then: "$students", else: [] } } } } }
}, activity_name: { $ifNull: ["$activity_type", {
$ifNull: ["$type", "$activityName" ] } } } }, {
$project: { activity_name: 1, participant_count: {
$size: "$participants_array" } } }, { $group: {
_id: "$activity_name", total_participants: {
$sum: "$participant_count" } } }, { $sort: {
total_participants: -1 } }, { $limit: 1 }, { $project:
{ _id: 0, activity_type: "$_id", total_participants:

```

```
1 } } ] );
```

## Query with Output:

```
raghvendra> db.activities.aggregate([ { $addFields: { participants_array: { $cond: { if: { $isArray: "$participants" }, then: "$participants", else: { $cond: { if: { $isArray: "$student_ids" }, then: "$student_ids", else: { $cond: { if: { $isArray: "$students" }, then: "$students", else: [] } } } } } }, activity_name: { $ifNull: ["$activity_type", { $ifNull: ["$type", "$activityName"] } ] } } }, { $project: { activity_name: 1, participant_count: { $size: "$participants_array" } }, { $group: { _id: "$activity_name", total_participants: { $sum: "$participant_count" } } }, { $sort: { total_participants: -1 } }, { $limit: 1 }, { $project: { _id: 0, activity_type: "$_id", total_participants: 1 } } ] ); // raghvendra 1240258347
[ { total_participants: 0, activity_type: 'Workshop' } ]
raghvendra> |
```